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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/663,714	09/17/2003	Daijiro Inoue	57810-076	2234
<div>7590 05/31/2007 McDERMOTT, WILL & EMERY 600 13th Street, N.W. Washington, DC 20005-3096</div>			<div>EXAMINER SEFER, AHMED N</div>	
			<div>ART UNIT 2826</div>	<div>PAPER NUMBER</div>
			<div>MAIL DATE 05/31/2007</div>	<div>DELIVERY MODE PAPER</div>

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/663,714	Applicant(s) INOUE ET AL	
	Examiner A. Sefer	Art Unit 2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 February 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4,6-10,12 and 14-29 is/are pending in the application.
- 4a) Of the above claim(s) 8,10,17-22,24 and 25 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4,6,7,9,12,14-16,23 and 26-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>3/19/07 & 4/11/07</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. The amendment filed February 28, 2007 has been entered and new claims 27-29 have been introduced.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-4, 6, 9, 14-16, 23 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamura et al. ("Nakamura") CN 1265228 (cited in the IDS filed 4/11/2007).

Nakamura discloses (fig. 2 and equiv. US PG-Pub 2003/0010993) a nitride-based semiconductor light-emitting device comprising: a first conductivity type first nitride-based semiconductor layer 25 formed on a substrate (B layer made of Si doped GaN cited in par. 78) or first conductivity type GaN substrate (**as in claim 23**); an active layer 27; a first undoped optical guide layer 29 formed on said active layer; a second conductivity type second nitride-based semiconductor layer 30 consisting **p-AlGaN (as in claim 3)**, having a single layer structure with a thickness of at least 0.1 μm (par. 93) formed on said first undoped optical guide layer; a contact layer 31 having a thickness within the recited range (par. 95) formed on said second nitride-based semiconductor layer; and an electrode 32 formed on said contact layer, but lacks anticipation of an undoped contact layer.

However, Nakamura discloses in fig. 1 undoped contact layer 8 -- note that Nakamura discloses that layer 8 is preferably made of GaN (par. 63) -- formed directly on a second nitride-based semiconductor layer 7 without another second conductivity type layer having the recited thickness intervening therebetween; and the undoped contact layer does not include Al.

Therefore, in view of Nakamura's 1st embodiment teachings, one having an ordinary skill in the art at the time the invention was made would be motivated to modify Nakamura's device of 2nd embodiment by incorporating an undoped contact layer. The motivation would be to provide a semiconductor layer having less crystal defects and achieve a preferable ohmic contact with the p-electrode as taught by Nakamura's 1st embodiment (par. 63).

Re claim 2, Nakamura discloses the undoped contact layer (GaN) having a band gap smaller than the band gap of said second nitride-based semiconductor layer (AlGaN).

Re claim 4, Nakamura discloses a first conductivity type first nitride-based semiconductor layer being an n-type first nitride-based semiconductor layer, and said second conductivity type second nitride-based semiconductor layer being a p-type second nitride-based semiconductor layer.

Re claim 6, Nakamura discloses undoped contact layer (GaN) having a band gap larger than the band gap of said active layer (InGaN).

Re claim 9, Nakamura discloses said undoped contact layer being single undoped nitride-based semiconductor layer.

Re claim 14, Nakamura discloses said second conductivity type second nitride-based semiconductor layer including a second conductivity type second nitride-based semiconductor

Art Unit: 2826

layer consisting of AlGa_N 30, and said first undoped optical guide layer includes an undoped optical guide layer consisting of Ga_N (par. 91).

Re claim 15, Nakamura discloses in fig. 2 a second conductivity type second nitride-based semiconductor layer including a second conductivity type cladding layer **p-AlGa_N** having a projection, said contact layer 30 being formed on the upper surface of said projecting portion of said second conductivity type cladding layer, and said projecting portion of said second conductivity type cladding layer and said contact layer constitute a ridge portion.

Re claim 16, Nakamura discloses an active layer **27** consisting of a nitride-based semiconductor containing In (par. 87), said nitride-based semiconductor light-emitting device further comprising a protective layer **28** of a nitride-based semiconductor layer formed on said active layer.

The recitation calling “for preventing In contained in said active layer from desorption” attempts to distinguish the invention from the prior art in terms of function rather than structure. See *In re Schreiber*, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997); See also *In re Swinehart*, 439 F.2d 210, 212-13, 169 USPQ 226, 228-29 (CCPA 1971; *In re Danly*, 263, F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959).

4. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamura in view of Sugiura et al. (“Sugiura”) JP 10-215034 (of record).

Nakamura discloses the device structure as recited in the claim, but do not specifically disclose the undoped contact layer containing InGa_N.

Sugiura discloses (fig. 2 and elements listed on col. 14) a nitride-based semiconductor light-emitting device comprising: an undoped contact layer 20 formed on a second nitride-based

Art Unit: 2826

semiconductor layer; and an electrode 22 formed on said undoped contact layer, wherein said undoped contact layer contains InGaN.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to incorporate Sugiura's teachings so as to reduce contact resistance of semiconductor layer and electrode as taught by Sugiura.

5. Claims 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamura.

Nakamura discloses (fig. 2 and equiv. US PG-Pub 2003/0010993) a nitride-based semiconductor light-emitting device comprising: a first conductivity type first nitride-based semiconductor layer 25 formed on a substrate; an active layer 27, formed on said first nitride-based semiconductor layer; a first undoped optical guide layer 29 formed on said active layer; a second conductivity type second nitride-based semiconductor layer 30, having a single layer structure with a thickness of at least 0.1 μm (par. 93), formed on said first undoped optical guide layer; a contact layer formed directly 31 on said second nitride-based semiconductor layer without another second conductivity type layer having a thickness of less than 0.1 μm intervening therebetween; and an electrode 32 formed directly on said contact layer, wherein said contact layer has a single-layer structure and a thickness within the recited range (par. 95), but lacks anticipation of an undoped contact layer.

However, Nakamura discloses in fig. 1 undoped contact layer 8 -- note that Nakamura discloses that layer 8 is preferably made of GaN (par. 63) -- formed directly on a second nitride-based semiconductor layer 7 without another second conductivity type layer having the recited thickness intervening therebetween; and the undoped contact layer does not include Al.

Art Unit: 2826

Therefore, in view of Nakamura's 1st embodiment teachings, one having an ordinary skill in the art at the time the invention was made would be motivated to modify Nakamura's device of 2nd embodiment by incorporating an undoped contact layer. The motivation would be to provide a semiconductor layer having less crystal defects and achieve a preferable ohmic contact with the p-electrode as taught by Nakamura's 1st embodiment (par. 63).

Re claim 28, Nakamura discloses the band gap of said undoped contact layer (GaN) being smaller than the band gap of said second nitride-based semiconductor layer (AlGaN).

Re claim 29, Nakamura discloses said undoped contact layer (GaN) having a band gap larger than the band gap of said active layer (InGaN).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to A. Sefer whose telephone number is (571) 272-1921.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sue Purvis can be reached on (571) 272-1236.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Application/Control Number: 10/663,714

Page 7

Art Unit: 2826

ANS

May 26, 2007



A. Sefer
Patent Examiner
Art Unit 2826